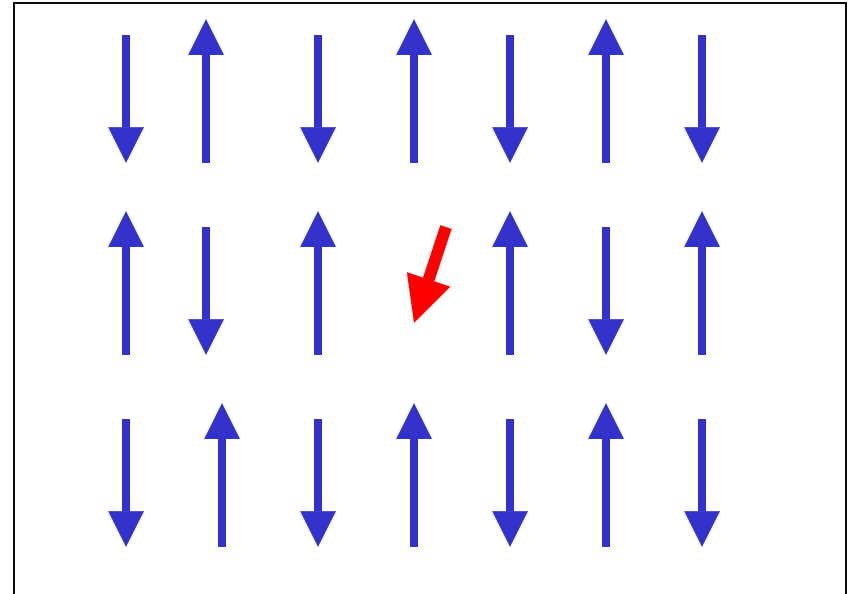


# Quantum Frustration of Decoherence in Open Quantum Systems

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Decoherence is the process in which quantum effects are destroyed by the interaction of a quantum mechanical system with the environment. This process is the hallmark of the crossover from the quantum to the classical world and is the major limitation for the realization of quantum computers. By studying the problem of magnetic impurities in magnetic media we have discovered that decoherence can be reduced via quantum frustration. In a quantum frustrated system dissipation of energy is suppressed even when the coupling to the environment is strong.

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An impurity spin  $\frac{1}{2}$  (red) fluctuates on an antiferromagnetic background of spins  $S$  (blue). The environmental spins generate a dissipative motion for the impurity spin that is quantum frustrated.